JAXA Increment 47&48 Utilization Overview

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Payload Operations Integration working Group Face to Face #39
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JAXA
Explore to Realize

Increment 47/48 JAXA Utilization

- ***JAXA has defined Key Message since Increment 45/46 for new stage of Utilization.***
- ***Key message of Increment 47/48 is***

"Continuous and stable operations in the new stage of Kibo Utilization"

~ Usability improvement with variation of exposed payload size and more frequent opportunities of pressurized experiment~

Important topic of investigations

1. Mouse Experiment

   Inc.47/48: Mouse Epigenetics

2. Protein Crystalization

   Inc.47/48: PCG #10, PCG Demo #2, Low Temp PCG

3. Electrostatic Levitation Furnace (ELF)
4. Diversification of Exposed Facility

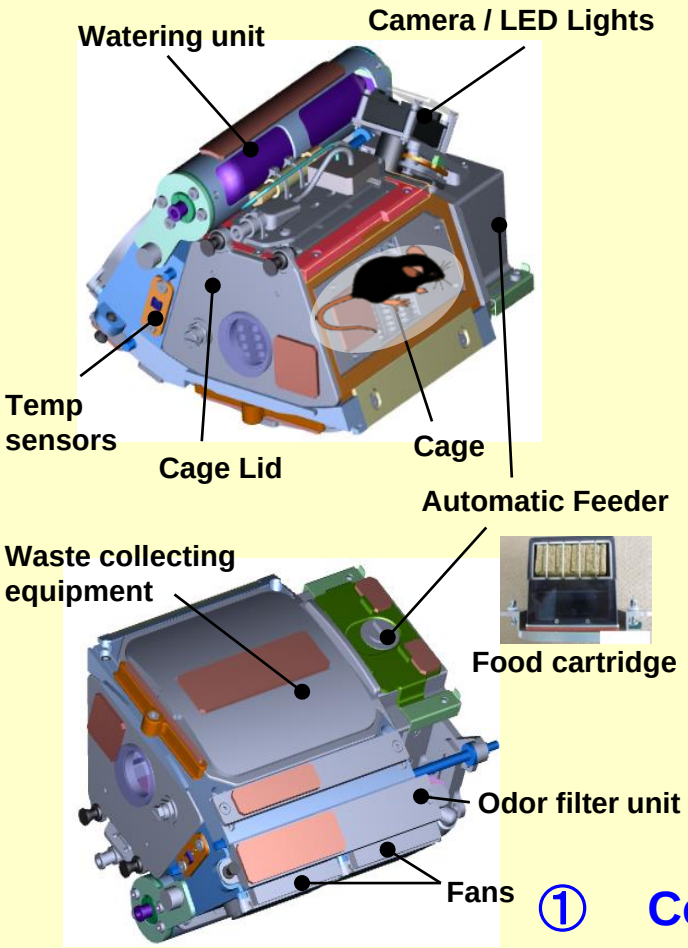
   Inc.47/48: J-SSOD-M1, EFU-Adapter, ExHAM, J-SSOD #5

5. Medical Health

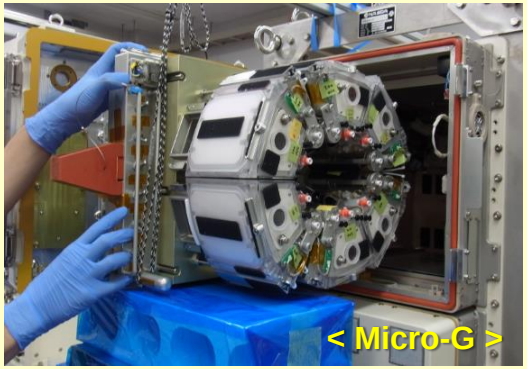
   Inc.47/48: IPVI, Multi-Omics

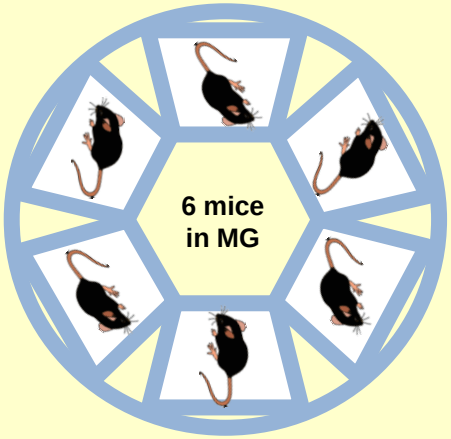
Life Science / JAXA Mouse Project

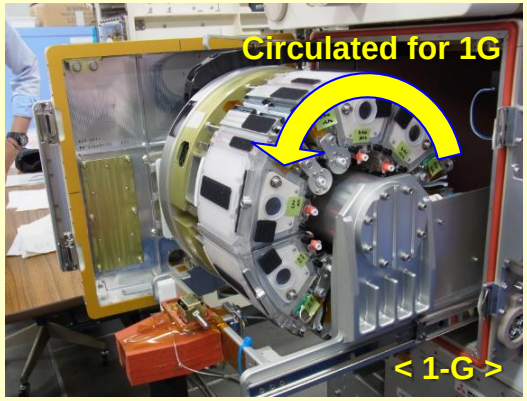
Mouse Habitat Unit (MHU)

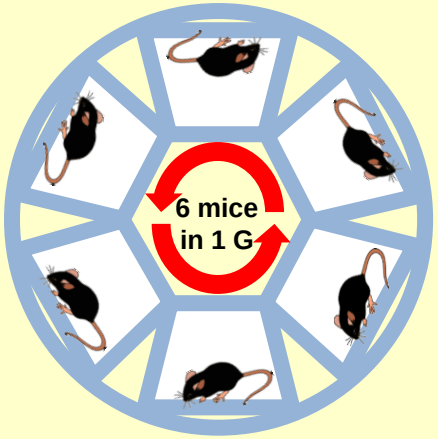


Mouse Habitat Cage Unit









① Comparison between micro-G and artificial-G (1G)

② Individual habitat (1 male mouse per cage)

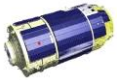
③ Return mice to the ground in live condition

Life Science / JAXA Mouse Project

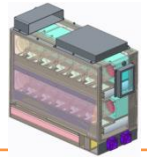
Inc. 44	Inc. 45/46	Inc. 47/48

MHU installation and Function Checkout were completed in Inc 45/46.

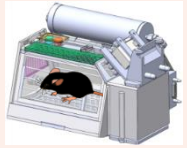
MHU Checkout



Mouse habitat Unit (MHU)
Launched by HTV5



Live mice (12)
Launched by SpX-9



Weekly maintenance (Food/Water supply, Cleaning) are performed.

Experiment <30days>

Live mice (12)
Returned by SpX-9

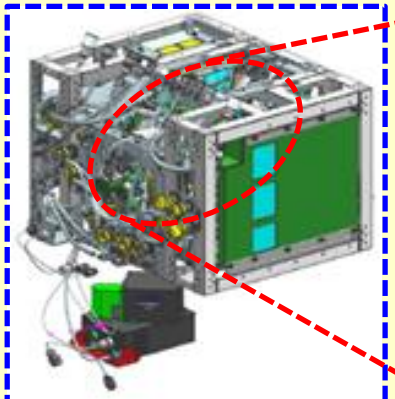
Overview of Mouse Experiment

① MHU was launched by HTV-5, and then installed into the Cell Biology Experiment Facility (CBEF) for checkout. (MHU installation and checkout was completed by K.Yui (43S crew))

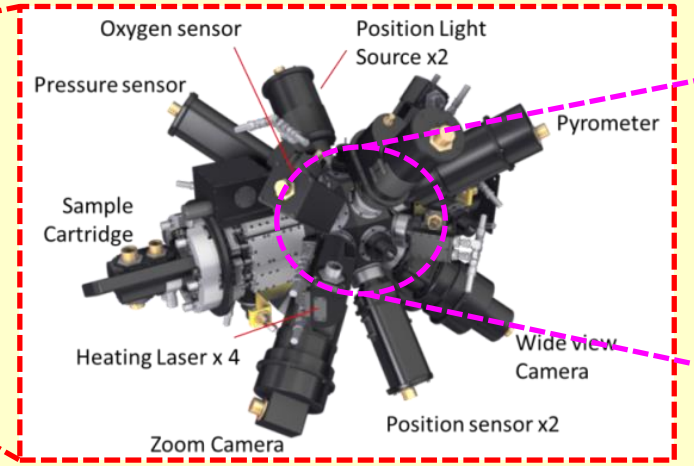
② Live mice (12) will be launched and returned by SpX-9.

③ Skilled researchers dissect mice for detailed analysis.

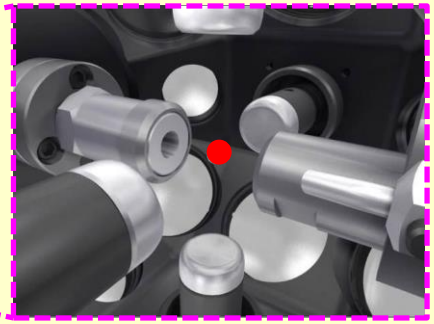
Material science / High melting point



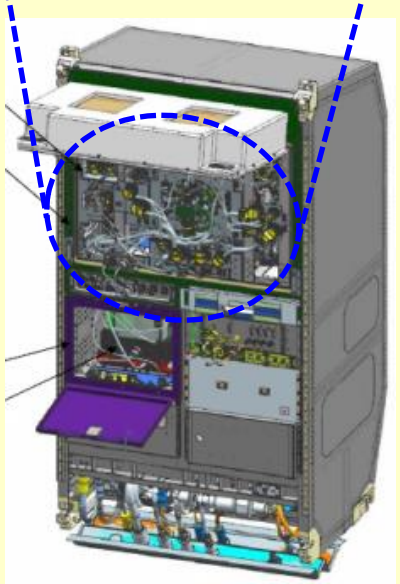
External view



Observation Unit



Non-contact positioning



Multi purpose Small Payload Rack #2 (MSPR2)

① Levitate a sample by Coulomb force. (can handle insulators as well as conductors)

② Melt the sample by semiconductor lasers (4)

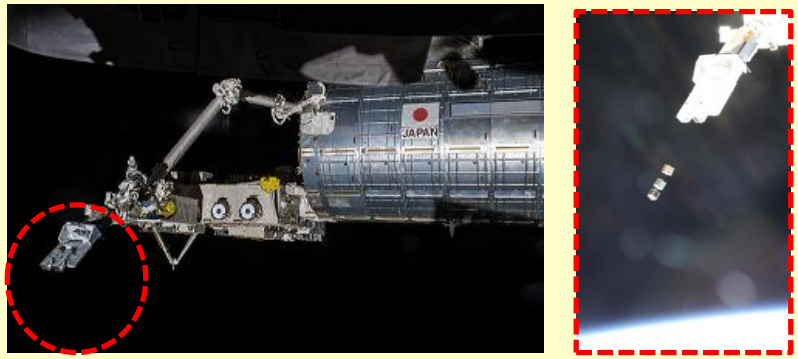
③ Capable to measure – density, surface tension, viscosity of molten samples at high temperatures.

Movie is available at http://iss.jaxa.jp/kiboexp/equipment/pm/elf/

Electrostatic Levitation Furnace (ELF)

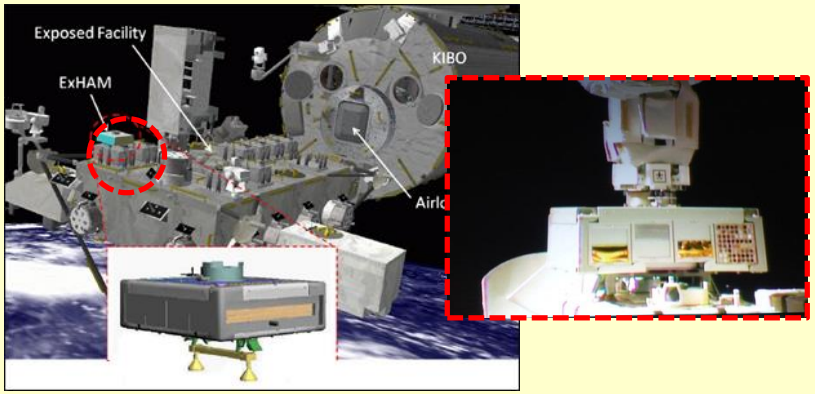
Space Science / Exposed Facility

Offer of the space utilization opportunity



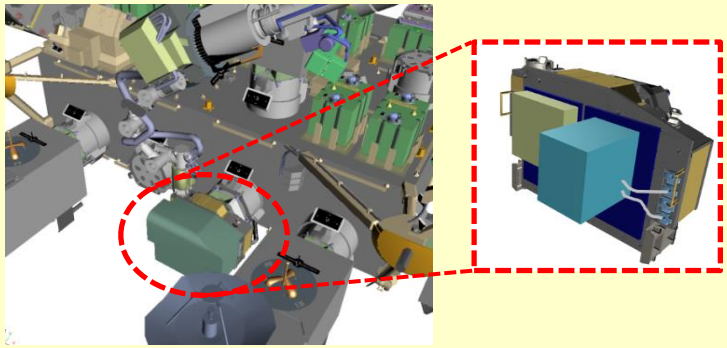
JEM Small Satellite Orbital Deployer (J-SSOD)

- Mechanism for deploying small satellites designed in accordance with CubeSat specification (10cm x 10cm x 10cm or 20cm or 30 cm).



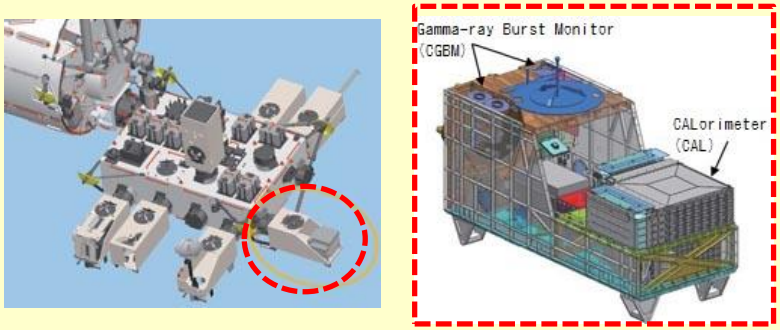
Exposed Experiment Handrail Attachment Mechanism (ExHAM)

- Mechanism for conducting space exposed experiments. Experimental samples can be placed onto the surfaces of the ExHAM.



Exposed Facility Unit (EFU) Adapter

- Platform for providing opportunities of high-frequency exposed experiment. Accommodate two payloads.



CALorimetric Electron Telescope (CALET)

- CALET mission is to research for dark matter and origin of high energy cosmic ray. CALET is equipped with the latest detection technology and electronics called “CALorimeter” to determine energy and directions of cosmic ray.

Space Science / Exposed Facility

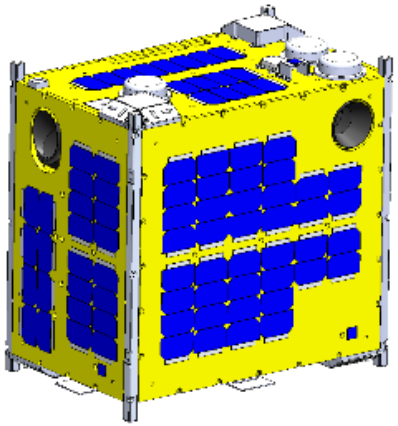
Variation of Small Satellite Orbital Deployer size

J-SSOD-M1

- Mechanism for deploying 550x550x350mm satellite

Diwata-1

Collaboration between Universities of Japan and Philippines.



Diwata-1 Overview

Class;	50kgMicrosatellite
Dimensions:	550x550x350mm
Inclination:	51.6deg
Altitude:	400 km - 420 km
Lifespan:	～1 year at 400 km
Launch Date:	1Q 2016

High Precision Telescope

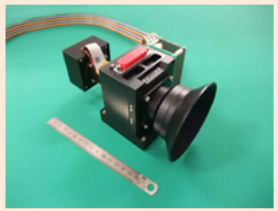
Spatial Resolution
3m

Field of View
1.9 x 1.4km

Application
Determine the extent of damages from disasters

Monitor cultural and natural heritage sites

SMI with LCTF



Spatial Resolution
80m

Field of View
52 x 39km

Application
Monitor changes in Vegetation

Monitor ocean productivity

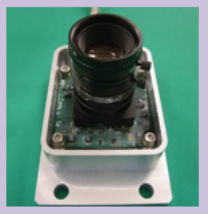
Wide Field Camera

Spatial Resolution
7km

Field of View
180° x 134°

Application
Observation of cloud patterns and weather disturbances

Middle Field Camera



Spatial Resolution
185 m

Field of View
121.9 X 91.4 km

Application
Assists in determining the locations of images captured using the HPT and SMI

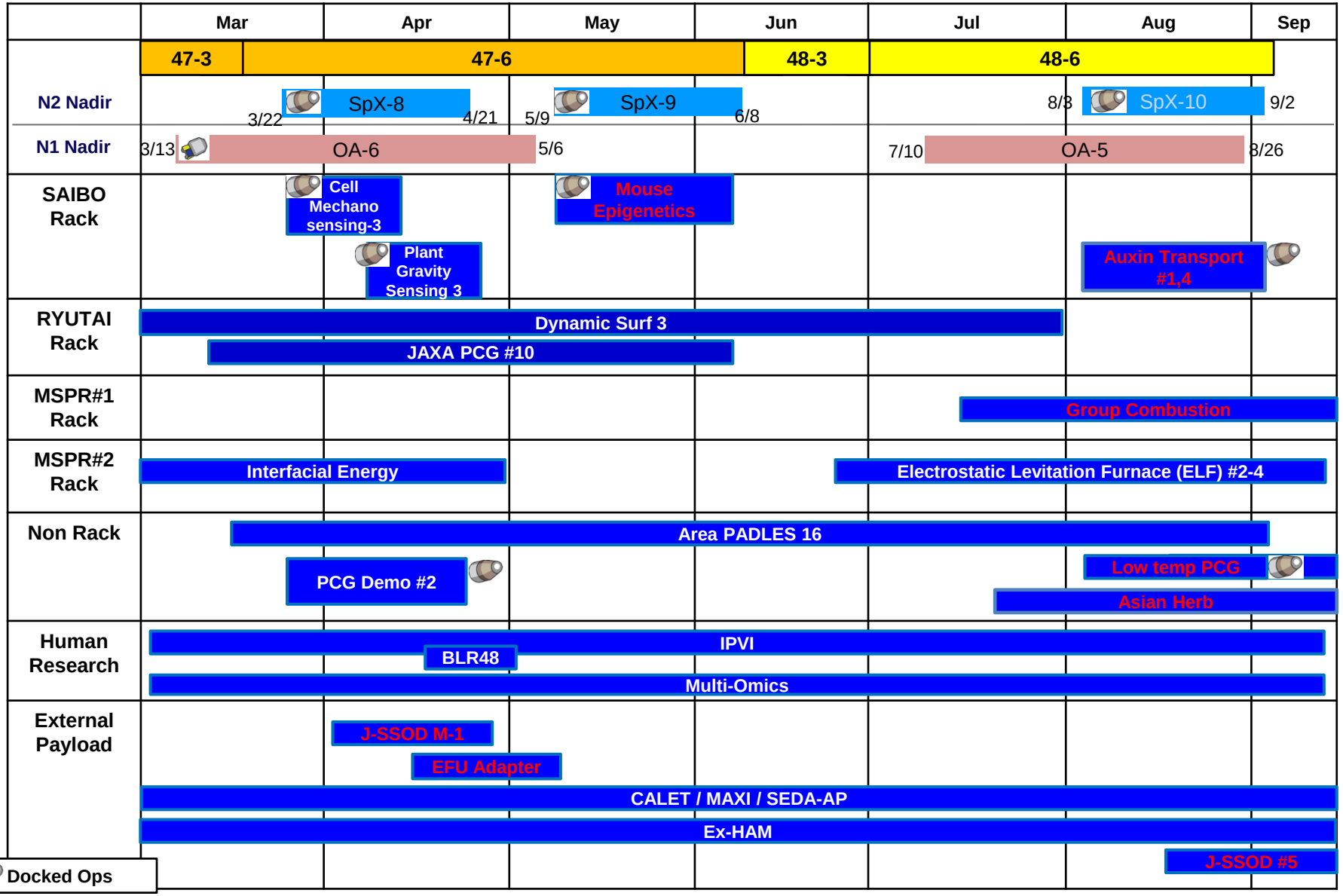
Increment 47/48 JAXA Investigations

The red letter is a new investigation in Increment 47/48.

Discipline	Investigations
Physical Science	Electrostatic Levitation Furnace (ELF)#1~4, Interfacial Energy, Group Combustion, Dynamic Surf 3, Marangoni UVP2, Atomization (Reserve Task)
Biology and Biotechnology	Mouse Epigenetics, PCG#10, PCG Demo #2 Low Temp PCG#1, Cell Mechanosensing3, Plant Gravity Sensing-3, Embryo Rad, Stem Cells, Space Pup Microbe-IV, Auxin Transport
Human Research	Intracranial Pressure & Visual Impairment (IPVI) Multi Omics, Probiotics Dry Run, Biological Rhythms 48Hrs
Technical Development	Area PADLES 16
Earth and Space Science (Exposed Facility)	J-SSOD M-1, JAXA Small GPS/Whl Demo Box,HDTV-EF2 (EFU Adapter) CALET, J-SSOD#5, MAXI, SEDA-AP, Handhold Platform (ExHAM)

Increment 47/48 JAXA Investigations

The red letter is a new investigation in Increment 47/48.



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